

# SURGICAL SAFETY UPDATE

## Cases from the Confidential Reporting System for Surgery (CORESS)

### Fatal pulmonary embolus after renal cancer surgery

A 65-year-old female had surgery for a large left renal tumour. The tumour was more advanced than anticipated and intraoperatively the decision was taken to do a multi-visceral resection: en bloc nephrectomy, distal pancreatectomy, splenectomy and left hemicolectomy (with end colostomy). She recovered well from the surgery and the renal cancer was completely resected.

She underwent uneventful elective reversal of colostomy 18 months later and was discharged seven days postoperatively. Seven days after discharge, she suddenly developed acute breathlessness and circulatory collapse, consistent with pulmonary embolism. Resuscitation and acute thrombolysis were unfortunately unsuccessful.

### Reporter's and CORESS comments

For the reversal of colostomy, thromboembolic prophylaxis had been provided as routine, with calf compression intraoperatively, VTE stockings and chemoprophylaxis while in hospital. Extended chemoprophylaxis was not provided. Extended prophylaxis is offered at our institution in line with 2018 NICE guideline for patients having surgery for cancer ([nice.org.uk/guidance/ng89/chapter/recommendations](https://www.nice.org.uk/guidance/ng89/chapter/recommendations)).

The guidelines recommend the following:

- Provide anti-embolism stockings until the person no longer has significantly reduced mobility relative to their normal or anticipated mobility.
- Add pharmacological VTE prophylaxis for a minimum of seven days for people undergoing abdominal surgery whose risk of VTE outweighs risk of bleeding, taking into account individual patient factors and according to clinical judgement.
- Consider extending pharmacological VTE prophylaxis to 28 days postoperatively for people who have had major cancer surgery in the abdomen.

It may be that extended prophylaxis would have reduced this patient's likelihood of experiencing a fatal pulmonary embolism. We wish to flag this to the profession so that surgeons undertaking major abdominal-pelvic surgery for

### References

1. Gibson F, Bodenham A. Misplaced central venous catheters: Applied anatomy and practical management. *Br J Anaesth* 2013; 110(3): 333-346.
2. Croghan SM, Zaborowski A, Mohan HM *et al*. The sentinel stent? A systematic review of the role of prophylactic ureteric stenting prior to colorectal resections. *Int J Colorectal Dis* 2019; 34(7): 1161-1178.

benign disease or malignancy should consider providing extended chemoprophylaxis.

### Line problem 1: PICC line misplacement

A 52-year-old man had a peripherally inserted central catheter (PICC) line inserted via the left cephalic vein for administration of long-term chemotherapy. Ultrasound guidance was used to aid peripheral line insertion, but no central imaging was undertaken.

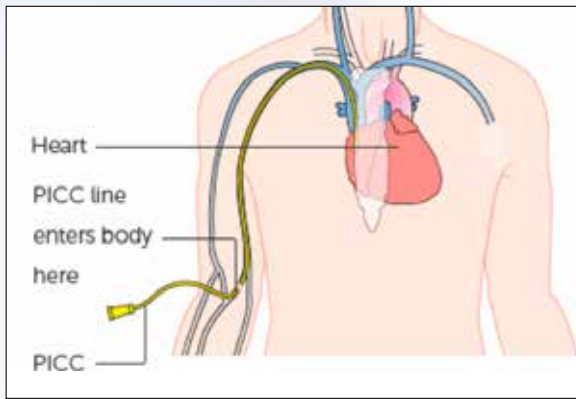
Some hours after return to the ward a chest X-ray showed the tip of the PICC line to be curled up in the right atrium. The patient had not suffered from arrhythmia or other cardiac-related side effects. The vascular registrar reviewed the X-ray and gently pulled the line back 4in.

A subsequent X-ray two to three hours later confirmed that the tip of line was still located in the heart. By this time another vascular trainee was on duty and attended to pull the line back a further 4in. On this occasion X-ray confirmed that the tip of the line was finally located in the superior vena cava.

### Reporter's and CORESS comments

NICE has issued specific guidelines on placement of PICC lines. Some commercially available systems use the patient's cardiac electrical activity to track catheter tip location or employ magnetic navigation with external measurement to determine tip positioning. Otherwise, fluoroscopy or chest X-ray should be undertaken to ensure the catheter tip lies in the superior vena cava prior to usage. In this case no immediate imaging was done to confirm correct siting of the catheter tip at initial placement, or during the subsequent two interventions to retrieve the inappropriately sited catheter from the patient's heart.

Advisory Board members commented that PICC lines may be variable in length and the length should be determined prior to placement. Imaging is mandatory following placement. Many units have a dedicated PICC line placement team and line placement should follow standardised guidelines within a unit.



The Advisory Board recommends that PICC line length should be determined before placement

### Line problem 2: CVP line causing haemothorax

A 69-year-old man was extubated in theatre and taken to the ICU at the end of the day following complicated surgery to remove a large colonic tumour. For rehydration purposes a 16g central venous line was placed via an anterior approach to the right internal jugular vein using a Seldinger technique under ultrasound control. Free blood was obtained from the catheter on aspiration after placement in the superior vena cava. Two hours later the patient developed chest pain with a mild tachycardia and pulse rate of 95bpm and his blood pressure dropped to 105/70mmHg. A chest X-ray showed the tip of the catheter within the thorax. A small haemothorax was noted.

The patient was resuscitated with fluids, normalising blood pressure and pulse rate, and the on-call vascular surgeon suggested gentle removal of the central venous catheter under aseptic technique. This was done by intensive care staff. Within an hour the patient's observations deteriorated again and a further urgent chest X-ray confirmed a large haemothorax. The cardiac surgical team were called and the patient was taken to theatre, where median sternotomy was undertaken, the haemothorax drained and a small tear in the superior vena cava oversewn. The patient made a satisfactory but protracted recovery from surgery.

### CORESS comments

A post-procedure chest X-ray should have been reviewed by the individual who performed the procedure. Once the patient had been diagnosed with a haemothorax, probably due to a misplaced catheter tip, removal should have been approached with caution. Placement of a guidewire prior to catheter removal might have allowed an endovascular approach to treating the perforated vena cava.

A useful aide-memoire with regard to a misplaced central venous catheter, in the short-term, is: 'if in doubt, don't take

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it out'.<sup>1</sup> Evaluation followed by removal of the catheter under vision after adequate exposure is advocated. This is in contrast with the situation of the misplaced endotracheal tube where the advice is 'if in doubt, take it out'.

### Ureteric injury despite sentinel stent placement

A 51-year-old female with a long history of complex diverticular disease developed a chronic abscess in the pouch of Douglas. It was decided that a sigmoid colonic resection was the way forward, but that preoperative placement of ureteric stents would help the surgeon identify the ureters. Surgery was difficult due to thick fibrotic reaction in the pelvis and a Hartmann's procedure was performed using a high-energy device. The inferior mesenteric pedicle was not mobilised, and dissection took place in a plane close to the colon. A pelvic drain was placed and the stents remained *in situ*. Recovery was complicated by an ileus and pelvic collection, noted on a day-seven CT scan.

External drainage of the collection was secured, but the sepsis continued for a further two weeks and a further scan showed the size of the collection increasing. Electrolyte analysis of the drain fluid was consistent with urine. A cystogram demonstrated no bladder abnormality. After a radiology review it was clear the left ureteric stent had been divided and was the source of the urine leak. An urgent nephrostomy was done and the patient was able to go home with a view to re-implanting the ureter at a later date.

### Reporter's comments

Stents do not prevent ureteric damage, but should allow easier identification of the structures at surgery and hence preservation. Unfortunately, the damage was not noted intraoperatively or postoperatively on two separate scans. The high-energy dissection device reduces the tactile feedback associated with traditional dissection. Retrospectively, hyperchloraemia was present on day four and could have alerted the team to a urinary leak earlier.

### CORESS comments

Prophylactic ureteric stents potentially reduce rates and facilitate intraoperative recognition of iatrogenic ureteric injury (IUI) during colorectal resections. However, there is a lack of consensus on the risks and benefits. The most frequent indications for prophylactic stents are diverticular disease, neoplasia and inflammatory bowel disease.

A systematic review has recently concluded that placement of prophylactic ureteric stents has a low complication rate<sup>2</sup>. However, there is insufficient evidence to conclude that stents decrease ureteric injury or increase intraoperative detection of IUIs. Apparently higher rates of IUI in stented patients likely reflect use in higher-risk resections. The use of lighted ureteric stents may facilitate recognition of the ureter in laparoscopic surgery.